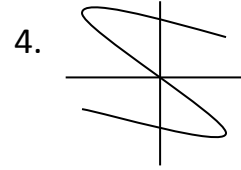
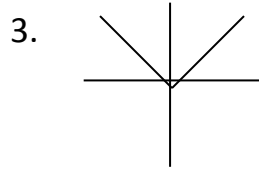
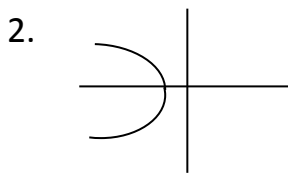
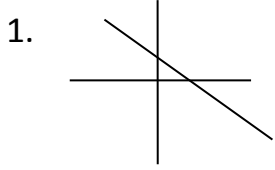


# 4.1

## Functions

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

Use the vertical line test to determine whether the curve is the graph of a function.



Find the domain of the function algebraically. Write your answer in interval notation. Show work!

5.  $f(x) = \sqrt{4x+3} + 2$

6.  $f(x) = -6\sqrt{-x+5} - 1$

7.  $f(x) = x^2 + 2$

8.  $f(x) = \frac{2x-3}{(x+1)(x-3)}$

9.  $f(x) = \frac{6}{x+5}$

10.  $f(x) = \frac{\sqrt{x+2}}{x^2-5x-6}$

11.  $f(x) = \frac{\sqrt{x-5}}{(x+2)(x^2+4)}$

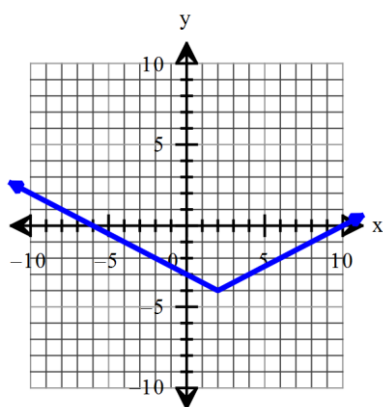
12.  $f(x) = -2|x+1| - 4$

13.  $f(x) = \frac{1}{x} - \frac{3}{x+7}$

14.  $f(x) = (x-1)^3 + 5$

Find the key features of each graph.

15.



Domain:

Range:

Increasing:

Decreasing:

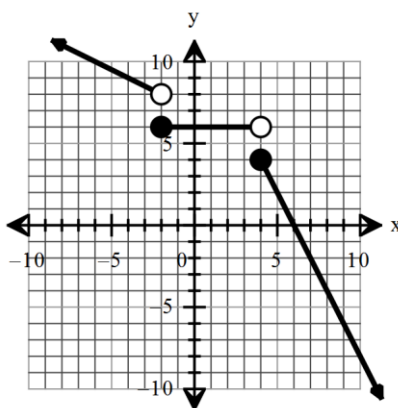
Constant:

Positive:

Negative:

$$\lim_{x \rightarrow -\infty} f(x) = \quad \lim_{x \rightarrow \infty} f(x) =$$

16.



Domain:

Range:

Increasing:

Decreasing:

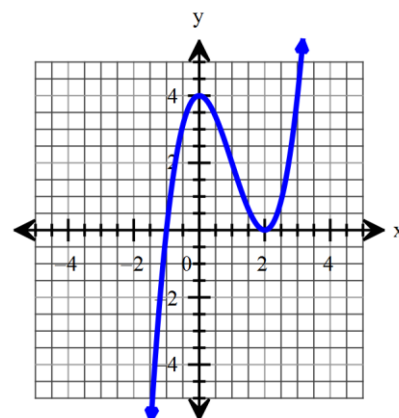
Constant:

Positive:

Negative:

$$\lim_{x \rightarrow -\infty} f(x) = \quad \lim_{x \rightarrow \infty} f(x) =$$

17.



Domain:

Range:

Increasing:

Decreasing:

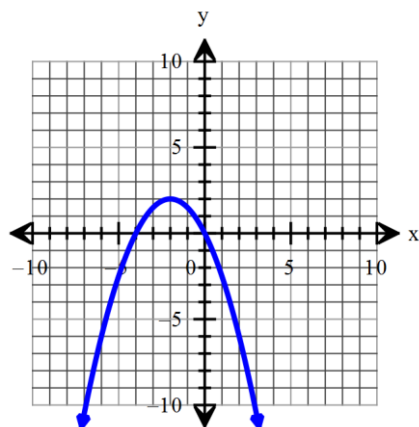
Constant:

Positive:

Negative:

$$\lim_{x \rightarrow -\infty} f(x) = \quad \lim_{x \rightarrow \infty} f(x) =$$

18.



Domain:

Range:

Increasing:

Decreasing:

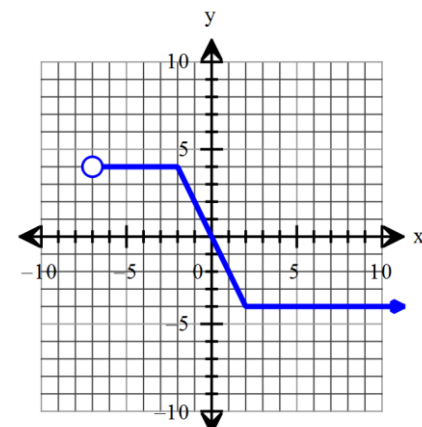
Constant:

Positive:

Negative:

$$\lim_{x \rightarrow -\infty} f(x) = \quad \lim_{x \rightarrow \infty} f(x) =$$

19.



Domain:

Range:

Increasing:

Decreasing:

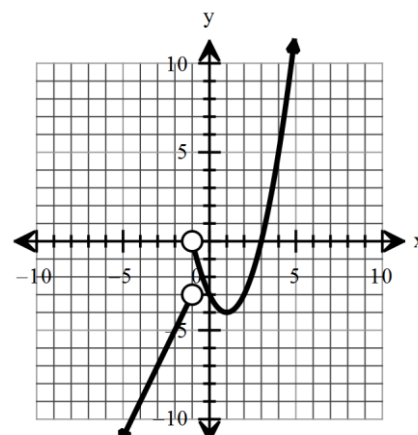
Constant:

Positive:

Negative:

$$\lim_{x \rightarrow -\infty} f(x) = \quad \lim_{x \rightarrow \infty} f(x) =$$

20.



Domain:

Range:

Increasing:

Decreasing:

Constant:

Positive:

Negative:

$$\lim_{x \rightarrow -\infty} f(x) = \quad \lim_{x \rightarrow \infty} f(x) =$$

Use a grapher to find all local maxima and minima and the values of  $x$  where they occur. Round answers to two decimal places.

21.  $f(x) = x^2 - 3x + 5$

22.  $f(x) = -x^2 + 6x - 7$

Find all horizontal and vertical asymptotes of the function. Then write the domain and range.

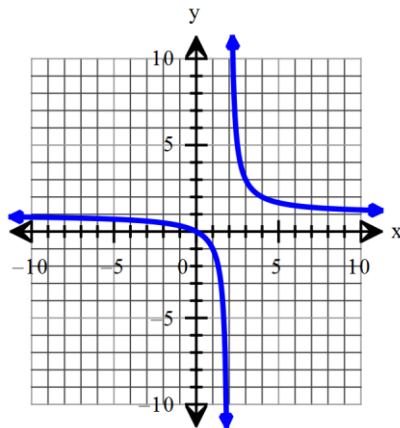
23.  $f(x) = \frac{x}{x-2}$

Horizontal Asymptote:

Vertical Asymptote:

Domain:

Range:



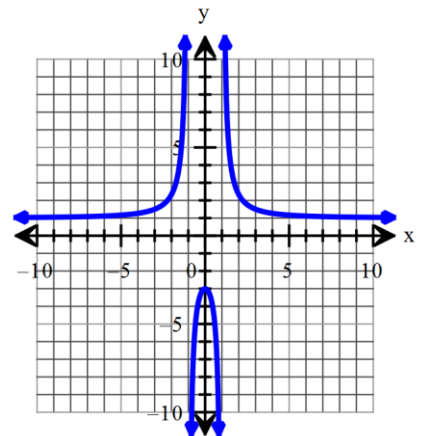
24.  $f(x) = \frac{x^2 + 3}{x^2 - 1}$

Horizontal Asymptote:

Vertical Asymptote:

Domain:

Range:



Use algebra to find the vertical asymptotes. Show work.

25.  $f(x) = \frac{x+1}{4-x}$

26.  $f(x) = \frac{5x+5}{x^3-1}$

27. A walkway with a width of  $x$  feet borders a garden that is 30 ft. by 50 ft. Determine the domain of the area function that describes the area which includes the walkway in terms of  $x$ , if the area is less than  $2016 \text{ ft}^2$ .

28. An object is thrown with an initial velocity of 50 ft/s. What is the real world domain for the situation?

Use  $h(t) = -16t^2 + 50t + 5$  as the model.

29. A square of side  $x$  centimeters is cut out of each corner of a 24 cm by 18 cm piece of thin plastic to form an open-topped box. Determine the domain of the volume function in terms of  $x$ .
30. A brick border of  $x$  feet is installed inside a garden that currently measures 30 feet by 24 feet. Determine the domain of the area function that describes the reduced garden in terms of  $x$ .
31. An object is dropped from a ledge of an open window that is 40 feet above the ground. What is the domain for the situation? (Hint: Use  $h(t) = -16t^2 + 40$ )
32. A parking garage charges \$1.25 per hour with a maximum charge of \$11.25 per day. Determine the domain.

## Review

## Factor

33.  $-x^2 + 2x + 8$

34.  $75x^2 - 363y^6$

35.  $12x^2 + 25x - 7$